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Readout Systems

MASS-STREAM™

Readout Systems with integrated Power Supply

General

This standardised series of readout systems can be applied for analogue mass flow meters and controllers. The most commonly used functions are offered in compact single channel table top

housings, DIN panel mount cassette and multi channel versions in 1/2 19" or 19" table top or rack housings.

Functions

- ◆ Power supply for MFM / MFC
- ◆ Indication of actual flow
- ◆ Indication of totalisation (counter)
- ◆ Set point potentiometer

Electrical Data

- ◆ Power supply 100...240 Vac at 50/60 Hz converted into 24 Vdc, 1 A
- ◆ Suitable for the connection of instruments with 0...5 Vdc input/output signal and 24 Vdc power supply
- ◆ 9-pin sub-D connector for the instrument connections
- ◆ Max. load per channel: 0,5 A at +24 Vdc

Model Number Identification

Code	Housing	
D - 11	1/2 19" table housing	42 TE
D - 12	19" table housing	84 TE
D - 13	1/2 19" rack	42 TE
D - 14	19" rack	84 TE
D - 15	Table top cassette	14 TE
D - 16	Panel mount cassette	14 TE
Code	Supply voltage	
- 00	100...240 Vac	
Code	Modules with blank front (14TE)	
- 00	Rear panel with power supply + protection + mains cable	
- 01	Rear panel with additional power supply and sub-D socket	
- 02	Rear panel with sub-D socket	
- 03	Rear panel blank	
Code	Modules with actual flow indication (14TE)	
- 10	Rear panel with power supply + protection + mains cable	
- 11	Rear panel with additional power supply and sub-D socket	
- 12	Rear panel with sub-D socket	
- 13	Rear panel blank	
Code	Modules with totalised flow indication (14TE)	
- 20	Rear panel with power supply + protection + mains cable	
- 21	Rear panel with additional power supply and sub-D socket	
- 22	Rear panel with sub-D socket	
- 23	Rear panel blank	
Code	Modules with actual flow indication and control potentiometer (14TE)	
- 30	Rear panel with power supply + protection + mains cable	
- 31	Rear panel with additional power supply and sub-D socket	
- 32	Rear panel with sub-D socket	
- 33	Rear panel blank	
Code	Modules with totalised flow indication and control potentiometer (14TE)	
- 40	Rear panel with power supply + protection + mains cable	
- 41	Rear panel with additional power supply and sub-D socket	
- 42	Rear panel with sub-D socket	
- 43	Rear panel blank	

Model D-15



Model D-11



Model D-14



Technical changes and alterations in construction are reserved.

Conversion Factor

MASS-STREAM™ mass flow meters and controllers are basically calibrated on air. If other gases or gas mixtures are used a conversion factor CF has to

be applied. This factor is determined by applying a complex formula. For a number of commonly used gases you will find the value in the chart below.

Conversion Factor Table

(L_n : 1013 mbar and 0°C air temperature) - [Please also refer to www.fluidat.com](http://www.fluidat.com)

Series / Gas	D-62xx	D-51xx	Series / Gas	D-62xx	D-51xx
Air	1.00	1.00	H ₂	-.--	1.01
Ar	2.01	1.40	He	-.--	1.41
CH ₄	0.67	0.76	HCL	1.58	0.99
C ₂ H ₂	0.75	0.61	N ₂	1.00	1.00
C ₂ H ₄	0.89	0.60	NH ₃	0.80	0.77
C ₂ H ₆	0.89	0.60	NO	1.02	0.97
C ₃ H ₈	0.63	0.34	N ₂ O	1.15	0.71
C ₄ H ₁₀	0.42	0.25	N ₂ O ₂	1.00	1.00
C ₅ H ₁₂	0.25	0.21	O ₂	0.98	0.98
CO	1.04	1.00	Xe	6.08	1.38
CO ₂	1.20	0.74	Conversion factor for other gases on request.		

Above mentioned values are only regarded as an indication. The exact conversion factors are significantly dependent on the process parameters, like media temperature and operating pressure, and on the physical characteristics of the gas.

The best accuracy can be obtained by calibrating the instrument under operating conditions. The conversion factor causes an additional error in the absolute accuracy. With a conversion factor >1 this error is 2 x CF (in % FS) and with a conversion factor <1 this error is 2/CF (in % FS).

Flow Profile and Sensitivity

In general mass flow measurement is very sensitive to variations of the shape of the flow profile. In comparable instruments, which do not consist of such precautions for these effects of inlet piping conditions, some severe variations in the accuracy might occur.

The MASS-STREAM™ flow meters are designed for a consistent, fully developed flow profile in the metering section and they are thus virtually insensitive to changes of the inlet piping conditions.

Pressure Loss

The pressure drop over the instrument's D-62xx measurement chamber is almost comparable to a straight run of pipe of the same diameter and is thus negligible. However, to make the instruments insensitive to upstream piping configurations, a number of mesh screens are required to condition the flow profile. These meshes create a certain pressure drop.

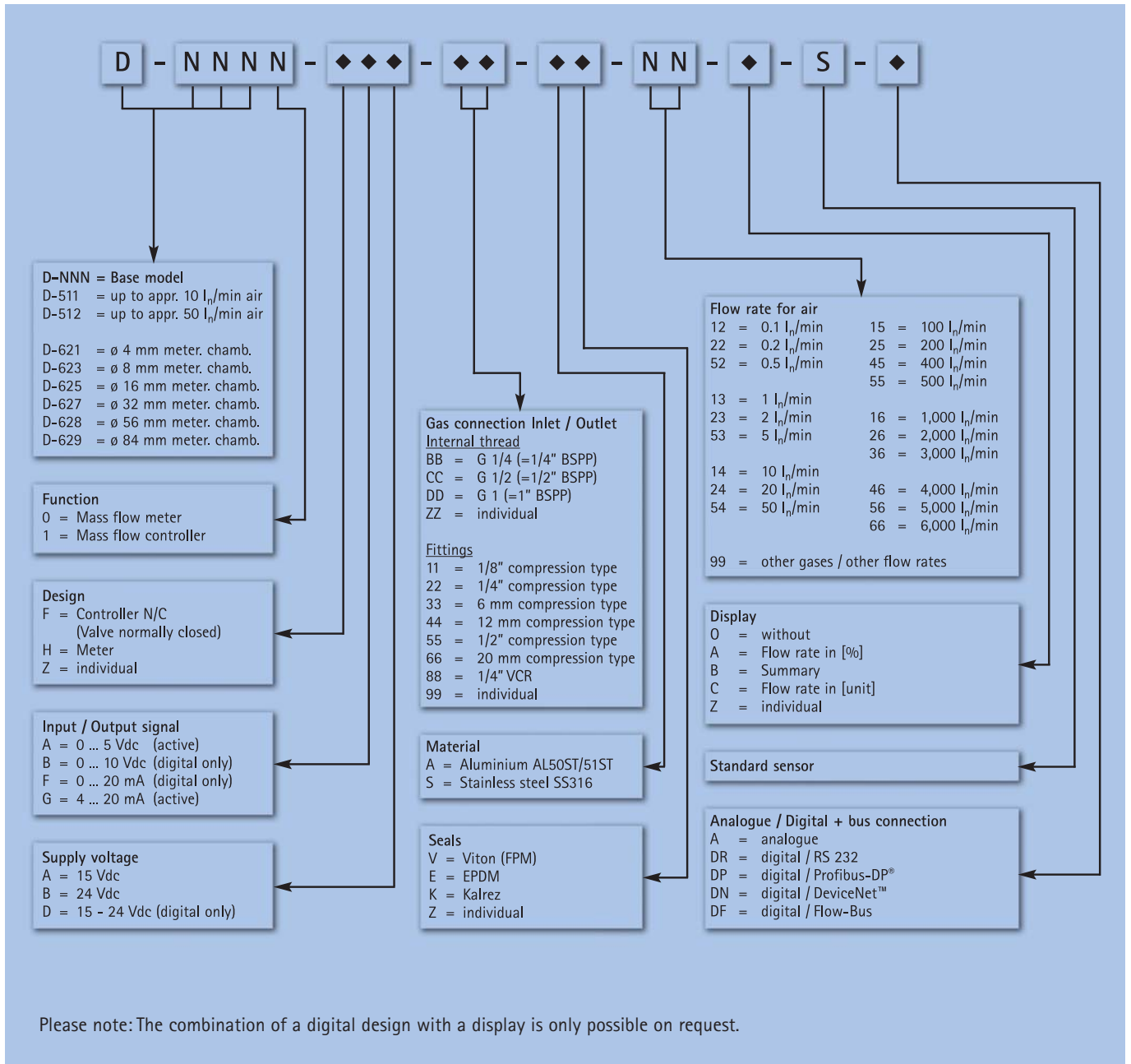
Also the often used compression type connections cause a significant additional pressure loss.

By reducing the number of mesh screens and using an inlet pipe the pressure loss can be significantly minimised as an option. In addition we recommend the use of fittings with maximum possible diameter.



Model Number Identification

MASS-STREAM™ Model Numbers and Options



Enquiry and Order Information

In order to supply the correct instrument for your application please forward the following data:

Type of gas, flow range, operating temperature and pressure (for controllers supply and back pressure), electrical connection, desired output signal, type of gas connections (fittings) and seals.

Based on this information the following calculations and checks will be carried out:

- ◆ Conversion of the requested flow to the Air-equivalent flow (the requested flow is divided by the referred conversion factor).
- ◆ For mass flow controllers only:
 - ◆ Check if the differential pressure over the valve (ΔP) is within the allowed limits.
 - ◆ Check if the calculated kv-value is within the specification.

Technical Specifications

Measurement System

Accuracy (based on Air calibration)	± 3 % FS including non-linearity (better accuracy on request)
Repeatability	± 0.5 % FS
Time constant sensor (63.2 %)	$\tau \leq 2$ sec.
Pressure sensitivity	± 0.3 % / bar typical (Air)
Temperature sensitivity	± 0.3 % / °C (Air)
Leak integrity	$< 2 \times 10^{-7}$ mbar l/s He
RFI (Radio Frequency Interference)	According to CE

Operating Limits

Range (Turn-down-Ratio)	5...100 % (1 : 20)
Type of gases	all gases compatible with materials chosen
Temperature	0...50 °C
Pressure rating	max. 10 bar (g); higher on request
Warm up time	within 30 min for optimum accuracy; within 30 sec for accuracy ± 4 % FS

Mechanical Parts

Sensor	AISI 316L
Body	AISI 316L or anodised Aluminium
Sieves	Stainless steel
Support rings	Teflon
Protection	IP 40

Electrical Properties

Supply voltage	15 Vdc ±10 % or 24 Vdc ±10 % 15...24 Vdc ±10 % (digital MFM / MFC only)
Current peak values	
Serie D-51xx...	75 mA max.
Serie D-62xx...	Inrush current 250 mA max. No flow 75 mA max. 100 % flow 175 mA max.
Control valve	+250 mA max.
Output signal	0...5 Vdc or 4...20 mA active 0...10 Vdc or 0...20 mA active (digital MFM / MFC only)
Connector	6-pin round DIN (analogue MFM / MFC only) 8-pin round DIN (digital MFM / MFC only)

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